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PATENT APPLICATION
Attorney Docket No. D/A2459

VIEWING TABULAR DATA ON SMALL HANDHELD DISPLAYS AND MOBILE PHONES

FIELD OF THE INVENTION

The present invention generally relates to methods for viewing documents and, more particular, to methods for rendering a portion of the document currently displayed on the user's client device wherein the manipulation of the user's viewpoint thereof is accomplished using the resources of the server and not the client-side device with the server repeatedly receiving viewpoint updates from the client and transmitting an updated image thereof back to the client.

BACKGROUND OF THE INVENTION

A relatively large amount of information takes the form of spreadsheet data, for example, tables, listings, etc. When displayed on a small handheld device such as a cellular telephone display, spreadsheets tend to be difficult to use because spatial structure and readability cannot be achieved simultaneously especially on small display devices. For the spatial structure to be visible, a large part of the spreadsheet should be made visible/readable to the end-user. Given the relatively small screen resolutions of mobile devices, text is simply not readable. For instance, in small handheld device image viewing scenario, due to the small size of the display screen of the handheld device, either a small section of the document displayed thereon is seen in readable form or the overall structure of the document is shown absent legibility. As such, a user needs a way to move around the various rows and columns of spreadsheets, tables, etc., where both spatial layout and text are important for display purposes.

This can be seen from Figs. 1a and 1b. Suppose, for instance, one is trying to find date corresponding to the "DS 9140" label. In Fig. 1a, we see

that the data shown is only "DS 9140" and the needed date "14-Sep." is not visible. To get to the desired information, one has to compare multiple views or remember row and/or column numbers as one moves their focus around the document. This way of navigating spreadsheets can be error prone and time consuming. Since memory is often limited in smaller devices, only sections or small portions of an entire spreadsheet can be held in memory at any one time. A split screen view with local split-bars can be implemented to enable the user to manipulate their viewpoint. This may be considered equivalent to selecting split view in an Excel-type spreadsheet and using scroll bars to navigate individual splits. However, one disadvantage with this approach is the need for software to reside on the hand-held device. This is often a problem due to small available storage, memory, and other limitations inherent on smaller devices with relatively tiny display screen area.

What is needed in this art is an image processing method that simulates split and scroll bars based on an image file format communicated between server and client.

BRIEF SUMMARY

What is disclosed is a method for presenting spreadsheets and other documents on client-side devices with limited resources and tiny display screen area. The present invention involves the user, on a client-side device, scrolling through a condensed image view of a document with the user's viewpoint of the image repeatedly computed server-side. A split-bar is stitched into a composite view of the user's current viewpoint. The user clicks a scroll-bar or scroll-points to indicate an intended change in direction of their current viewpoint. The client-side device provides the server with information as to where and how the next viewpoint is to be updated. Responsive to the received client information the server updates the viewpoint currently displayed with the transmission of images therefor and provides the same back to the client. In such a manner, the computing power and resources of the server are utilized for the image manipulation, cropping, etc. rather than that of the client's handheld device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1a illustrates a first view of a spreadsheet displayed on a device with a small display wherein the field labels are shown.

Figure 1b illustrates a second view of the same spreadsheet of Fig 1a displayed on the same device wherein the user has moved their focus to other data fields.

Figure 2a shows a vertical image line indicating the simulated split line along which subsequent image data will be folded.

Figure 2b, after clicking on the right side of the image, a new view is created at the server wherein the left of the image is maintained and a shifted right side image is appended such that the desired field "14-Sep" is in view.

DESCRIPTION OF THE SPECIFICATION

What is disclosed is a method for presenting spreadsheets and other documents on client-side devices with limited resources and tiny display screen area. The present invention involves the user, on a client-side device, scrolling through a condensed image view of a document with the user's viewpoint of the image repeatedly computed server-side. A split-bar is stitched into a composite view of the user's current viewpoint. The user clicks a scroll-bar or scroll-points to indicate an intended change in direction of their current viewpoint. The client-side device provides the server with information as to where and how the next viewpoint is to be updated. Responsive to the received client information the server updates the viewpoint currently displayed with the transmission of images therefor and provides the same back to the client. In such a manner, the computing power and resources of the server are utilized for the image manipulation, cropping, etc. rather than that of the client's handheld device. The advantage of which can easily be understood when regarding the document sizes associated with common documents.

The present invention utilizes a web-type browser interface to facilitate the display of a document image. An indicator for vertical or horizontal split-screen viewing with additional capabilities such as zoom, level, color, etc.

are also preferably provided. A split is indicated by embedding a line into the image provided to the client by the server. This is preferably done by the creation of three separate images, one of a left part, one of the center line, and one of a right part. Alternatively, a line might also be generated by drawing into the corresponding part of the image by other suitable image editing and/or image manipulation means. The server stitches the collected pieces into a single image. Fig. 2a shows the new view with the vertical line indicating the split. The current viewpoint of the user with respect to the image is calculated and the image updated accordingly such that only parts that can be viewed are transmitted to the client-side device (with some overlap around the periphery of the image). Then, a single image is transmitted to the client. The client-side device receiving the updated image from the server. The client-side device then displaying the image on the user's display screen preferably with the current viewpoint approximately central to the display area. This is achieved on the client-side device by graphic capabilities available thereon. In addition, the server can also transmit or otherwise provide to the client-side device one or more tools or other capabilities to facilitate the communication therebetween and/or the image presentation and viewpoint movement. Clicking on the right side of the displayed image by the user of the client-side device will initiate an event such that a new image is requested from the server. This is illustrated in Fig. 2b wherein parameters sent to the server provide the information necessary for the server to update the image including the composite sub-images stitched thereon. In the example, the right-most section of the image was changed to simulate scrolling. In the new image, the date 14-Sep can clearly be associated with the data row DS 9140.

Advantageously, using server-side processing along with server-side image manipulation dramatically reduces the amount of data presently needed to be displayed on the client's device. This frees client memory and reduces communication bandwidth. Scrolling in split-screen view requires that the client-side device have sufficient memory, storage, and other resource to run the necessary software performing the requested functions.

While particular embodiments have been described, alternatives, modifications, variations, improvements, and substantial equivalents that are or may be presently unforeseen may arise to applicants or others skilled in the art. Accordingly, the appended claims as filed and as they may be amended are intended to embrace all such alternatives, modifications variations, improvements, and substantial equivalents.